UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

ILLUMINA, INC., et al.,

Plaintiffs,

v.

BGI GENOMICS CO., LTD, et al.,

Defendants.

Case No. 19-cv-03770-WHO

CLAIM CONSTRUCTION ORDER

Re: Dkt. Nos. 97, 98

The parties in this matter, plaintiffs Illumina Inc. and Illumina Cambridge Ltd. (collectively, "Illumina") and defendants BGI Genomics Co., Ltd., BGI Americas Corp., MGI Tech Co., Ltd., MGI Americas, Inc., and Complete Genomics, Inc. (collectively, "BGI") assert claims for infringement against the other. They request construction of six terms from two patents asserted by Illumina and four terms from one patent asserted by BGI, which all relate to sequencing of nucleic acids. My constructions are below.

BACKGROUND

BGI and Illumina are competitors in the field of genomic sequencing.[1] Illumina filed the complaint in this matter on June 27, 2019. *Illumina I*, Dkt. No. 1. It alleges that BGI infringes U.S. Patent No. 9,410,200 (the "'200 Patent") and 7,566,537 (the "'537 Patent") by selling its sequencers and related reagents (collectively, "standardMPS"). *Id.* ¶¶ 2, 33-44. Illumina asserts that BGI's standardMPS sequencers infringe claim 1 of the '537 Patent and claim 1 of the '200 Patent. *Id.* ¶¶ 35, 37, 41. BGI filed counterclaims, alleging that Illumina's DNA sequencing

[1] This matter ("*Illumina I*") is related to *Illumina Inc., et al., v. BGI Genomics Co., Ltd.*, et al., Case No. 20-cv-1465 (N.D. Cal.) ("*Illumina II*"), in which Illumina alleges that BGI infringes different patents by making, selling, and using a different set of products. Further background in this matter is discussed in to *Illumina Inc., et al., v. BGI Genomics Co., Ltd.*, et al., Case No. 19-cv-3770, Dkt. No. 185. (N.D. Cal.).

systems infringe claims 1-3 and 5 of its U.S. Patent No. 9,944,984 ("'984 Patent"). Dkt. No. 94 ¶ 10.

The technology of all of the patents at issue relate to sequencing of deoxyribonucleic acid ("DNA"), which has significant value for understanding the human genome and researching diseases and genetic conditions, among other things. Dkt. No. 97 at 1. DNA takes the form of a "double helix" that is comprised of two strands of molecules called nucleotides. Dkt. No. 98 at 3. Every nucleotide consists of a sugar molecule and a phosphate molecule, which form the "backbone" of each DNA strand, and a chemical base that binds with a complementary chemical base in the other strand (often described as the "rung" of the DNA "ladder"). *Id.* at 2-3. The chemical base may be one of four molecules: adenine, guanine, cytosine, and thymine. *Id.* at 3. Each one of these molecules binds or pairs with only one other molecule; for example, guanine only pairs with cytosine and adenine only pairs with thymine. *Id.* Each party's patented technology is discussed further below.

LEGAL STANDARD

Claim construction is a matter of law. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). "Generally, a claim term is given its ordinary and customary meaning—the meaning that a term would have to a person of ordinary skill in the art ["POSITA"] in question at the time of the invention." *Howmedica Osteonics Corp. v. Zimmer, Inc.*, 822 F.3d 1312, 1320 (Fed. Cir. 2016) (internal quotation marks and citation omitted). In determining the proper construction of a claim, a court begins with the intrinsic evidence of record, consisting of the claim language, the patent specification, and, if in evidence, the prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005); *see also Vitronics*, 90 F.3d at 1582. "A claim term used in multiple claims should be construed consistently . . . ." *Inverness Med. Switzerland GmbH v. Princeton Biomeditech Corp.*, 309 F.3d 1365, 1371 (Fed. Cir. 2002).

"The appropriate starting point . . . is always with the language of the asserted claim itself." *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed. Cir. 1998). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of

ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Phillips*, 415 F.3d at 1313. "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). Such redefinition or disavowal need not be express to be clear. *Trustees of Columbia Univ. in City of New York v. Symantec Corp.*, 811 F.3d 1359, 1364 (Fed. Cir. 2016).

Like a person of ordinary skill in the art, courts read terms in the context of the claim and of the entire patent, including the specification. *Phillips*, 415 F.3d at 1313. The specification is "the single best guide to the meaning of a disputed term." *Vitronics*, 90 F.3d at 1582. "The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). The court may also consider the prosecution history of the patent, if in evidence. *Markman*, 52 F.3d at 980. The prosecution history may "inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317 (citing *Vitronics*, 90 F.3d at 1582–83); *see also Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005) ("The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution.") (internal quotations omitted).

In most situations, analysis of this intrinsic evidence alone will resolve claim construction disputes, *Vitronics*, 90 F.3d at 1583; however, a court can further consult "trustworthy extrinsic evidence" to compare its construction to "widely held understandings in the pertinent technical field," *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309 (Fed. Cir. 1999). Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Markman*, 52 F.3d at 980. All extrinsic evidence should be evaluated in light of the intrinsic evidence, *Phillips*, 415

F.3d at 1319, and courts should not rely on extrinsic evidence in claim construction to contradict the meaning of claims discernible from examination of the claims, the written description, and the prosecution history, *Pitney Bowes*, 182 F.3d at 1308 (citing *Vitronics*, 90 F.3d at 1583).

I. '537 AND '200 PATENTS

A. Technology

Illumina's asserted patents claim several aspects related to a DNA sequencing method known as sequencing-by-synthesis ("SBS"). Dkt. No 98 at 2-3. SBS uses the complementary pairing of nucleotide bases in order to sequence unknown DNA molecules. *Id.* It is possible to determine the sequence of one strand of a DNA molecule to be sequenced, often called target DNA, by identifying the sequence of the complementary nucleotides that bind with it. *Id.* at 3. In SBS, nucleotides are "incorporated" or bound to the target DNA strand and then "read" one by one. *Id.* In other words, nucleotides are added one at a time to bind with a complementary nucleotide base in the target DNA strand, and each time a nucleotide is added it is identified as adenine, guanine, cytosine, or thymine. *Id.* In this way, it is possible to determine the sequence of the target DNA strand.

Illumina's patents describe a process by which target DNA is first immobilized upon a surface (such as glass), copied, and treated with a sequencing primer. *Id.* at 4. Nucleotides are then added to the strand, generally by using an enzyme that can catalyze the incorporation of a new nucleotide to the target strand. *Id.* Each nucleotide contains a "blocking group," also known as a "protecting group," that prevents the next nucleotide from binding to the target DNA strand. *Id.* at 5. This blocking group is removable, however, so that once the nucleotide is read it can be removed and the next nucleotide incorporated. *Id.* Illumina's patents also claim nucleotides that contain unique chemical labels that are detectable so as to allow the reading of each nucleotide. *Id.*

The '537 and '200 Patents are both titled "Labelled Nucleotides." The '200 Patent is a continuation of the '537 Patent, and the parties seek constructions of the same terms at issue in both patents. *Id.* at 6. According to the invention in both patents, nucleotides that are added to the target DNA have a different florescent label for each chemical base, such that the florescent label

allows differentiation between nucleotides that have adenine, guanine, cytosine, or thymine bases. '537 Patent 1:47-54. This label is linked to the nucleotide via a cleavable linker group attached to the base. *Id.* 2:3-18, 2:50-3:3. The use of a cleavable linker (as opposed to one that cannot be removed) is important because it allows the label to be removed after each nucleotide is read. *Id.* 6:4-8. In this way, the label will not interfere with the reading of the next nucleotide's label. *Id.* In addition, each nucleotide also has a blocking group attached its sugar molecule that can also be removed. *Id.* 2:26-31. The blocking group attaches to an oxygen atom on the sugar molecule, at either the 2′ or the 3′ position. *Id.* 2:41-43; '200 Patent 8:28-35. When the blocking group is removed, it exposes a structure on the sugar molecule, a 3′ OH group, that allows a new nucleotide to bind to it. '537 Patent 2:25-29. Thus, while the blocking group is still attached to the nucleotide, no more nucleotides can bind to the existing strand, which allows for the ability to read the nucleotide (using the detectable label) before another one is added. *Id.* 7:51-57.

B. Claim Construction

The parties agree on the construction of the following two terms:

Claim Term	Agreed Construction
"nucleotide"	"A 'nucleotide' consists of a nitrogenous base, a sugar, and one or more phosphate groups. The term nucleotide encompasses analogs and derivatives of nucleotides. A 'derivative' or 'analog' of a nucleotide means a compound or molecule whose core structure is the same as, or closely resembles that of, a nucleotide, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleotide to be linked to another molecule."
"disulphide linkage"	"A chemical linkage including an S-S bond."

Dkt. No. 79-1 at 2. The parties dispute four terms, and I construe them as follows.

1. "incorporating into the nucleic acid molecule"

Term	Illumina's Proposal	BGI's Proposal	Court's Ruling
"incorporating into the nucleic acid molecule"	No construction necessary	"using an enzyme to add, at the 3′ end of the nucleic acid molecule"	"incorporating into the nucleic acid molecule at the 3′ end"

The dispute between the parties regarding this term is whether "incorporating into" the

nucleic acid molecule or target DNA requires the use of an enzyme. BGI argues that "[b]ecause the specification 'repeatedly and consistently characterizes' 'incorporation' as using an enzymatic means, it should be construed accordingly." Dkt. No. 112 at 7. It points out, and Illumina does not dispute, that all embodiments of the invention disclosed in the '537 Patent involve enzymatic incorporation. *Id.* at 8.

Illumina responds that "BGI has failed to point to any evidence in the prosecution history to show that Illumina or the Patent Office understood the term 'incorporating' to mean only enzymatic incorporation to justify limiting the claim scope here," in contrast with the plain and ordinary meaning. Dkt. No. 115 at 3. It also points to claim 2, which describes "[t]he method of claim 1, wherein said incorporating is accomplished via a terminal transferase, a polymerase or a reverse transcriptase." Dkt. No. 98 at 8. It argues that this claim indicates that claim 1 is not meant to require enzymatic incorporation. *Id.*

Other claims in the patent, such as claim 2, can shed light on the meaning of a claim term, and "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Phillips*, 415 F.3d at 1314–15. However, the description in claim 2 does not clearly support Illumina's construction. As BGI points out, this claim specifies only three of many possible enzymes that may be used to achieve incorporation. Dkt. No. 112 at 9. With this in mind, claim 2 could be read to show that claim 1 does require use of an enzyme and claim 2 describes preferred enzymes. Therefore, the language of claim 2 is ambiguous with respect to the construction of "incorporating" as used in claim 1.

Looking to the language of the specification, BGI is correct that "when a patent 'repeatedly and consistently' characterizes a claim term in a particular way, it is proper to construe the claim term in accordance with that characterization." *GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1370 (Fed. Cir. 2016). In addition, in certain circumstances courts will limit claim terms in accordance with the only disclosed embodiments of the invention. *See Wang Labs., Inc. v. Am. Online, Inc.*, 197 F.3d 1377, 1383 (Fed. Cir. 1999). But at the same time, it is well-established that courts should not import limitations from the specification into the claim terms where there is no "clear disavowal of claim scope" by the patentee. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313,

1327 (Fed. Cir. 2002).

The Federal Circuit "has narrowly construed claim terms in light of the preferred embodiment when the patent has described the preferred embodiment as the invention itself." *SunRace Roots Enter. Co. v. SRAM Corp.*, 336 F.3d 1298, 1305 (Fed. Cir. 2003). In addition, "[w]hether an invention is fairly claimed more broadly than the 'preferred embodiment' in the specification is a question specific to the content of the specification, the context in which the embodiment is described, the prosecution history, and if appropriate the prior art, for claims should be construed, when feasible, to sustain their validity." *Wang Labs*, 197 F.3d at 1383.

Here, it is undisputed that the patent specification only discloses embodiments that employ enzymatic incorporation, and that such incorporation is preferred. The summary of the invention states that

> In the present invention, a nucleoside or nucleotide molecule is linked to a detectable label via a cleavable linker group attached to the base, rendering the molecule useful in techniques using Labelled nucleosides or nucleotides, e.g., sequencing reactions, polynucleotide synthesis, nucleic acid amplification, nucleic acid hybridization assays, single nucleotide polymorphism studies, *and other techniques using enzymes such as polymerases, reverse transcriptases, terminal transferases, or other DNA modifying enzymes.*

'537 Patent 2:3-18 (emphasis added). Once again, this shows that enzymes are preferred aspects of the invention, but is not a clear disavowal of incorporation using non-enzymatic means.

The remaining intrinsic and extrinsic record in this case provides little additional context with respect to this meaning. BGI points to the testimony of Illumina's expert in a prior proceeding, who stated that he interpreted "incorporation" in the context of the patent as "polymerase mediated incorporation." Dkt. No. 112 at 9. However, the patent plainly contemplates a broader definition of "incorporation" than incorporation using the specific enzyme polymerase, and this expert did not provide an opinion on claim construction in the prior proceeding. Dkt. No. 112-2 at 23:17-25:2. Accordingly, this testimony is not useful to construing the term at issue.

Second, BGI states that the patents incorporate by reference and claim priority to a British patent application that states that the claimed molecule "is useful in techniques where the labelled molecule is to interact with an enzyme." Dkt. No. 112 at 10-11. This evidence is also not helpful

in determining the scope of the term. The British patent application, like the '537 Patent specification, merely states that incorporation by enzymes is preferred.

Although this is a close question, I am not persuaded that the patentee clearly disavowed incorporation by non-enzymatic means or that it is appropriate to limit the term in this way. Using an enzyme to incorporate a nucleotide is not so central to the invention as to be considered the invention itself. The inventive aspect of the patent is not the use of enzymes in incorporation, but the properties of the nucleotides that are used in that process. Moreover, the plain meaning of "incorporation" is broader than incorporation by enzymatic means.[2] As Illumina points out and BGI does not dispute, other methods of incorporation were known at the time of the claimed invention and could potentially have been used with the claimed invention. Dkt. No. 98 at 9; Dkt. No. 112 at 10. There is no clear indication in the patent that the patentee intended the claims to be limited to enzymatic incorporation or that enzymatic incorporation was necessary to practice the invention; if anything, the patent describes broader alternative methods of incorporation. *See* '537 Patent 2:3-6 (nucleotides are "useful in techniques using Labelled nucleosides or nucleotides); 3:60-62 ("The nucleotides/nucleosides are suitable for use in many different DNA-based methodologies").

At oral argument, BGI asserted that it is not arguing that there was a "clear disavowal" of the patent scope, but bases its argument on "single embodiment" cases. Dkt. No. 179 10:17-22. These cases are distinguishable. In *GPNE*, the court noted that the prosecution history of the patent supported its construction that limited the term as it was consistently described in the specification, and that the term was used over 200 times throughout the specification. 830 F.3d at 1369–71. In *Choon's Design, LLC v. Idea Vill. Prod. Corp.*, the court noted that the context of the patent and the dependent claims supported the construction at issue, and found that the broader construction "would eliminate these benefits [of the invention] and expand the scope of the claims

[2] The parties extensively dispute Dr. Sutherland's testimony as to the meaning of "incorporation," but this dispute is largely directed to the use of the term in the '537 Patent, and not the plain and ordinary meaning. *See* Dkt. Nos. 163, 165. Dr. Sutherland's assertion that a POSITA would most typically use the term "incorporation" when referring to enzymatic means, Dkt. No. 112-28 ¶ 53, is undermined by his use of the same term to refer to enzymatic incorporation and his recognition that chemical incorporation methods were available. *Id.* ¶ 52; Dkt. No. 163-6.

beyond the specification." 776 F. App'x 691 at 695–96 (Fed. Cir. 2019). And in *Barkan Wireless Access Techs., L.P. v. Cellco P'ship*, the court rejected a reading of a term as encompassing WiFi and cellular technology based upon the fact that the entire patent was characterized by WiFi. 748 F. App'x 987, 991 (Fed. Cir. 2018). These cases involved claim terms that were central to the invention, with persuasive additional evidence that the patentee intended the to limit the term.

BGI argues that the patent contains such additional evidence because it states that the invention provided benefits over prior art by reducing "steric hindrance with the polymerase enzyme." *See* '537 Patent 7:54-57. But this reference to a preferred embodiment is mentioned only once and is not fairly characterized as a key benefit of the invention. It does not suffice to limit the term "incorporation" in claim 1 in the context of the rest of the specification and record. As discussed, the intrinsic record does not reflect BGI's limitation of the claim term, the specification does not "make[] clear that the invention does not include" this feature, and the incorporation of nucleotides by an enzyme is not so central to the invention as to be the invention itself. *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001). Accordingly, I will not construe the term in a way that limits it to enzymatic incorporation.

Finally, the parties briefly dispute whether it is appropriate to include "at the 3′ end of the nucleic acid molecule" to this term, although neither side provides robust analysis on this point. Unlike the use of an enzyme for incorporation, the patent clearly and unequivocally states that incorporation occurs at the 3′ end of the sugar, and repeatedly refers to exposure of the 3′-OH group. Illumina's only argument that the construction should not include "on the 3′ end" is limited to an argument that such inclusion is not in accord with the plain meaning of "incorporating," Dkt. No. 115 at 2, and that it is possible to incorporate at other locations during synthesis. Dkt. No. 163 at 2. However, Illumina fails to address the term at all in light of the specification and the claim, which clearly demonstrates that incorporation must occur at the 3′ end of the sugar. *See* '537 Patent 2:27-28 ("The protecting group can be removed to expose a 3′-OH"); *id.* 19:57-59 ("said protecting group can be modified or removed to expose a 3′-OH group").

Accordingly, I construe the term "incorporating into the nucleic acid molecule" as

"incorporating into the nucleic acid molecule at the 3′ end."

2. "said protecting group can be modified or removed to expose a 3′ OH group"

Term	Illumina's Proposal	BGI's Proposal	Court's Ruling
"said protecting group can be modified or removed to expose a 3′ OH group"	No construction necessary	Indefinite	No construction necessary

The protecting group as described in the '537 and '200 Patents may be attached to either the 2′ or the 3′ carbon atom of the sugar molecule of the nucleotide, or both. '537 Patent 7:59-64; '200 Patent 8:30-35. The central question with respect to the term "said protecting group can be modified or removed to expose a 3′ OH group" is whether the "modification" of the protecting group as contemplated by the patents is impossible and renders the term indefinite. BGI contends that the term is indefinite because "a POSITA cannot discern how a 3'-protecting group could be 'modified' to expose a 3'-OH in any way that is different than, or alternative to, 'removal' of the 3'-protecting group." Dkt. No. 112 at 12. In order to expose a 3′ OH group as described in the invention of the patents, the 3′-protecting group must be entirely removed; thus, "modification" is impossible. *Id.*

"A claim is invalid for indefiniteness if its language, when read in light of the specification and the prosecution history, fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1377 (Fed. Cir. 2015) (citation and internal quotations omitted). A patent is presumed valid under 35 U.S.C. § 282. *Id.* The parties do not dispute that in the prior IPRs, indefiniteness was not at issue. However, Illumina highlights that the Patent Trial and Appeal Board did not affirmatively find the term to be indefinite and argues that prior argument contradicts BGI's indefiniteness argument. Dkt. No. 115 at 6-9.

The scope of the invention in the '537 and '200 Patents is the ability of the deblocking group, when desired, to expose the 3′ OH group on the nucleotide such that another nucleotide can bond with it. Although this is accomplished via removal of the deblocking group, the patent's use

of the word "modify" suggests another possibility.[3] Illumina presents two ways in which the protecting group can be "modified" without being removed. Dkt. No. 98 at 12-13. First, "the protecting group can be attached at both the 3′ and 2′ positions, and can be cleaved to expose the 3′ OH group." '200 Patent 8:33-35. Alternatively, for the 2′ position, making the protecting group smaller may allow for deblocking without removal of the protecting group. Dkt. No. 115 at 9.

BGI appears to concede that if the protecting group is attached to the 2′-position, as claimed in the '537 Patent, it could be made smaller to expose the 3′ OH group. Dkt. No. 112 at 13. Thus, there is no real dispute that this term is not indefinite as it is used in the '537 Patent because the protecting group can be "modified" by being made smaller. By contrast, although the '200 Patent contemplates that the protecting group can be attached at both the 3′ and 2′ positions, its claims are limited to protecting groups attached to the 3′ position. '200 Patent 20:63-67, 22:1-4. According to BGI, this renders the claim indefinite. But while the '200 Patent claims attachment of the protecting group "via the 3′ oxygen atom," *id.* 20:64, it does not preclude the possibility of attachment at the 2′ oxygen atom as well.

In addition, Illumina argues that "a POSITA would appreciate that the claim language was intended to cover the full scope of processes that could expose the 3′ OH group." Dkt. No. 115 at 9-10. The process used to expose the 3′ OH group could be two-part, with the protecting group being first modified and then removed in a two-stage reaction. *Id.* at 10. Illumina provides an as example an azidomethyl being modified to an aminomethyl prior to removal. *Id.* This represents another way in which a protecting group may be "modified" in the '537 and '200 Patents.

In light of the claim terms and specification, I conclude that the use of the word "modified" in the '200 and '537 Patents does not appear to render the term indefinite. A POSITA would reasonably understand that, in certain circumstances, a protecting group may expose the 3′ OH group by "modification" such as removal from the 3′ but not the 2′ position, if the protecting group

[3] I note that there is some merit to Illumina's statement that BGI's arguments at times appear to challenge enablement challenge, as opposed to indefiniteness. Dkt. No. 98 at 12. BGI has not put forward a persuasive argument that a POSITA would not be able to determine the scope of the invention such that he or she would not understand what conduct would be infringing, but rather that "modification" is impossible.

is attached to both, or by a process in which the protecting group is removed in more than one stage. At any rate, the scope of the invention would not have been unclear to a POSITA. No construction is necessary. That said, at oral argument, BGI expressed its intent to raise the issue of indefiniteness after completion of expert discovery, and I will review its further argument then. Dkt. No. 179 26:3-11. At this stage, I find that the term "said protecting group can be modified or removed to expose a 3′ OH group" is not indefinite and find that the term does not need construction.

3. "comprises an azido group" or "comprising an azido group"

Term	Illumina's Proposal	BGI's Proposal	Court's Ruling
"[comprises/comprising] an azido group"	"an azido group is a chemical moiety of the structure C(R4)(R5) – N3 where R4 is H or alkyl and R5 is H or alkyl and 'alkyl' refers to groups having 1 to 8 carbon atoms"	"includes at least an azido group (i.e. a group of three nitrogen atoms covalently linked, represented as (–N3))"	"includes at least an azido group (i.e. a group of three nitrogen atoms covalently linked, represented as (–N3))"

The dispute between the parties with respect to this term centers on whether the "azido group" should be limited to the group described in Figure 3 of the '537 Patent, or whether it should have a broader meaning that more closely tracks the plain and ordinary meaning of the term. BGI proposes a construction that it contends is in accord with the plain and ordinary understanding of the chemical structure of an "azido group." Dkt. No. 112 at 13-14. By contrast, Illumina argues that the construction should be governed by the specific structure disclosed in Figure 3 of the '537 Patent. Dkt. No. 98 13-14. The group disclosed in Figure 3 is a particular type of azido group (e.g., an azidomethyl), while BGI contends that "azido group" can encompass other molecules as well. Dkt. No. 112 at 16.

I find BGI's construction of the term to be more appropriate. As discussed above, it is inappropriate to import limitations from the specification, absent "clear disavowal of claim scope" by the patentee. *Teleflex*, 299 F.3d at 1327. For this reason, it is also improper to limit a claim term as described in a drawing. *MBO Labs., Inc. v. Becton, Dickinson & Co.*, 474 F.3d 1323,

1333-34 (Fed. Cir. 2007) ("Limiting claims from the specification is generally not permitted absent a clear disclosure that the patentee intended the claims to be limited as shown"); *compare Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) ("This court has, on occasion, supplied a definition by implication, if the specification manifests a clear intent to limit the term by using it in a manner consistent with only a single meaning").

The '537 Patent repeatedly describes Figure 3 as being exemplary. *See* '537 Patent 4:11-12 ("[s]ome suitable functional groups for R_1 and R_2 include the structures shown in FIG. 3"); *id.* 4:17-18 ("FIG. 3 shows some functional molecules useful in the invention"); *id.* 7:67-8:1 ("Some examples of such protecting groups are shown in FIG. 3"). Illumina has pointed to no evidence in the specification or in the extrinsic record that the patentee intended the azido group in claim 1 of the '537 Patent and claim 1 of the '200 Patent to be limited to the structure in Figure 3. If the patentee had wanted to limit the claim to azidomethyl, it could have used that term instead of the broader term "azido group." By contrast, Dr. Sutherland has provided persuasive evidence that BGI's proposed definition comports with the plain and ordinary meaning of "azido group." Dkt. No. 112-28 ¶¶ 39-46.

Moreover, the patent states that "[s]uitable protecting groups will be apparent to the skilled person, and can be formed from any suitable protecting group disclosed in Green[e] and Wuts." '537 Patent 7:65-67. Illumina argues that "[a] POSITA reviewing the claim language and the specification as a whole would understand that although Greene and Wuts discloses a wide variety of protecting groups, the 'azido group' in the context of the asserted claims corresponds to the azido structure shown in Figure 3 of the '537 Patent, as reflected in Illumina's construction." Dkt. No. 115 at 14. It also states that "the azido structure in Illumina's construction is the only protecting group that is found in both Fig. 3 of the '537 Patent and the examples that BGI identified from Greene and Wuts." *Id.* However, Illumina provides no expert testimony or other support for this argument. As BGI points out, Greene and Wuts discloses several structures that include an azido group and thus could be removed to expose a 3′-OH group. Dkt. No. 112 at 16.

Therefore, the term ""[comprises/comprising] an azido group" is construed as "includes at least an azido group (i.e. a group of three nitrogen atoms covalently linked, represented as (–

N3)).”

4. “nucleoside”

Term	Illumina’s Proposal	BGI’s Proposal	Court’s Ruling
“nucleoside”	“A ‘nucleoside’ is structurally similar to a nucleotide, but are missing the phosphate moieties. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule.”	“A ‘nucleoside’ consists of a nitrogenous base, a sugar, and there are no phosphate moieties attached to the sugar. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule.”	“A ‘nucleoside’ is structurally similar to a nucleotide, but are missing the phosphate moieties. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule.”

The parties’ sole dispute relates to the first sentence of the definition of “nucleoside.” Illumina’s proposed definition, including the phrase “[a] ‘nucleoside’ is structurally similar to a nucleotide, but are missing the phosphate moieties,” tracks the language of the specification. ’537 Patent 4:59-60. BGI faults Illumina’s construction only because it requires a fact finder to reference the construction of “nucleotide” in order to determine the construction of “nucleoside.” Dkt. No. 112 at 17. It instead proposes “[a] ‘nucleoside’ consists of a nitrogenous base, a sugar, and there are no phosphate moieties attached to the sugar.” *Id.*

I will construe the term “nucleoside” in accordance with the clear language of the specification. I do not find that it would confuse the fact-finder to reference the definition of “nucleotide,” to which the parties agree. Therefore, I construe “nucleoside” as “[a] ‘nucleoside’ is structurally similar to a nucleotide, but are missing the phosphate moieties. The term nucleoside

encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule."

II. BGI'S '984 PATENT

C. Technology

The '984 Patent involves an "array," or mechanism for analyzing multiple DNA fragments, that aims to increase the accuracy and efficiency of sequencing and thereby lower the cost. '984 Patent 3:44-53; 8:4-40; Dkt. No. 97 at 2. The '984 Patent describes a solid support surface (such as glass or quartz), which has molecules immobilized or "disposed" on the surface in a particular way so as to increase the accuracy of the detection signal while allowing for large-scale detection. *Id.* At times, the patent refers to the immobilized DNA molecules as "capture oligonucleotides." *Id.* 5:46-53. In addition, the patent describes the DNA that is to be sequenced, also described as "target polynucleotides" or "target DNA." *Id.* 3:58-64; 11:55-57. Target DNA is copied and modified prior to introduction to the array so that it will bind with the capture oligonucleotides on the array. *See*, e.g., *id.* 6:17-30. It is then introduced to the array and binds to the capture oligonucleotides, and the target DNA can be sequenced by measuring signals or labels on the array. *Id.* 3:44-4:23, 17:30-18:33.

The '984 patent describes the preparation of the target DNA before it is introduced to the support surface. The target DNA fragments are first amplified so that multiple copies of the same fragment are present in one large macromolecule (as opposed to one single DNA fragment). *Id.* 11:7-11. Amplification is generally understood to allow for stronger signal detection. Dkt. No. 97 at 2; '984 Patent 2:36-40. The claimed invention involves generally involves amplification of the fragments before they are bound to the array.[4]

For example, in one embodiment of the '984 Patent, the source DNA to be sequenced is first treated to form many single-stranded fragments. *Id.* 11:20-22. The DNA fragments then are

[4] The patent claims advantages over SBS conducted either without amplification or after in situ amplification as posing difficulties. *Id.* 2:36-51.

treated so that they bind with "adaptor oligonucleotides," compounds that allow the fragments to bind to themselves so that they form circles. *Id.* 11:25-43. The adaptor oligonucleotides can also include other features such as tagging or detection sequences. *Id.* 11:39-43. After the DNA fragment circles are formed, they are bound together into larger molecules containing multiple copies of the same circular DNA fragments, usually in a process called rolling circle replication ("RCR"). *Id.* 11:45-58. These larger macromolecules are called "concatemers" when they are derived from linear fragments such as in natural (not synthetic) DNA. *Id.* 10:32-45. They may also be "dendrimers," or branched in structure, such as when they derive from synthetic DNA. *Id.* The adaptor oligonucleotides in the concatemers bind to capture oligonucleotides on the solid surface binding sites. *Id.* 11:67-12:21. Because there will be multiple copies of the same DNA fragment present at a particular binding site, the detection and sequencing of that fragment will be improved.

A key aspect of the invention is the layout of the array so as to allow for optimal signal detection. The patent discloses a pattern of capture oligonucleotides bound to the solid support such that certain areas of the support contain oligonucleotides and certain areas do not. *Id.* 16:58-65. The areas without oligonucleotides will thus not bind with any target DNA, and allow for space between the binding areas so that detection and sequencing is easier. Dkt. No. 97 at 3. It is also possible to have a "random" array, which contain oligonucleotides that are located uniformly across the solid support. *Id.* The claimed array is high-density, which allows more DNA fragments to be detected and sequenced per square millimeter of solid support surface. *Id.* Thus, the patent claims certain densities of binding regions, separated by non-binding regions, that have DNA molecules attached to them that are detectable.

D. Claim Construction

1. "DNA binding regions" and "More Than 50% Of The DNA Binding Regions In The Array Have Multiple Copies Of One Single DNA Of Said More Than 105 Different DNAs" and "More Than 80% Of The DNA Binding Regions In The Array Have Multiple Copies Of The One Single DNA"

Term	BGI's Proposal	Illumina's Proposal	Court's Ruling

"DNA binding regions"	No construction necessary. *In the alternative:* "spatially discrete regions for binding DNA"	"discrete, spaced apart regions that are sized to each bind at most a single DNA molecule"	No construction necessary.
"[more than 50% of the] DNA binding regions [in the array] …"	No construction necessary.	"[more than 50% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"	"[more than 50% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"
"[more than 80% of the] DNA binding regions [in the array]…"	No construction necessary.	"[more than 80% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"	"[more than 80% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"
"more than 50% of the DNA binding regions in the array have multiple copies of one single DNA of said more than 10_5 different DNAs"	No construction necessary. *Alternative*: "Within the 'more than 50%' of DNA binding regions that have multiple copies of one single DNA, there may also be additional, different DNAs present."	"more than 50% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"	"more than 50% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"
"more than 80% of the DNA binding regions in the array have multiple copies of the one single DNA"	No construction necessary. *Alternative:* "Within the 'more than 80%' of DNA binding regions that have multiple copies of one single DNA, there may also be additional, different DNAs present."	"more than 80% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"	"more than 80% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"

The parties indicated that the terms "DNA binding regions" and "More Than 50% Of The DNA Binding Regions In The Array Have Multiple Copies Of One Single DNA Of Said More Than 10^5 Different DNAs"/"More Than 80% Of The DNA Binding Regions In The Array Have

Multiple Copies Of The One Single DNA" call for separate constructions. However, as both parties acknowledge in their briefing, construction of all of these terms requires parallel determinations of whether (i) the claim requires that each DNA binding region have one, and only one, DNA *sequence*, and (ii) the claim requires that each DNA binding region have one, and only one, DNA *molecule*. See Dkt. No. 113 at 6; Dkt. No. 116 at 3. Therefore, I will address the two terms together.

With regard to the first question, the patent clearly contemplates that each DNA binding region have only one DNA sequence. Claim 1 states that "the sequence of the single DNA at each DNA binding region is not known." '984 Patent 75:29-30. The specification describes an array with sites "containing multiple copies of the same DNA per spot," and spots that have "single informative DNA species." *Id.* 7:10-15. The description in the patent of the preparation of concatemers and dendrimeters describe how to create macromolecules containing multiple copies of the same DNA fragment. Further, the invention functions efficiently due to the ability to read multiple identical signals from these concatemers without interference from signals from other DNA sequences.

BGI does not dispute that the claim language of "one single DNA" refers to a single DNA sequence. Instead, it contends that the only dispute is whether the 50% and 80% limitations should include the word "only," as Illumina proposes. Dkt. No. 116 at 3. It contends that the during amplification, errors can cause DNA copies with non-identical sequences, and thus a concatemer may have some segments that are not identical to the source DNA or the other segments. *Id.* at 4. Thus, BGI's argument is effectively based upon contemplated errors in the sequencing process. *Id.*

BGI's position is undermined by the language of the claim term itself. The language "one *single* DNA" indicates that one, and only one, DNA sequence is present in each binding region. Were BGI's interpretation correct that additional, different DNAs could also be present, *see* Dkt. No. 97 at 11, the inventor could have written "one DNA" or "at least one DNA" of the 100,000 or more different DNAs. The use of the term "one single" is clear: only one DNA sequence is present. *Phillips*, 415 F.3d at 1314 ("In some cases, the ordinary meaning of claim language as

understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words."). Illumina argues that the addition of the word "only" is necessary to prevent BGI from making the argument that its claim encompasses more than one DNA sequence per binding region.[5] Dkt. No. 113 at 12. Accordingly, I find that this term is appropriate for construction and adopt Illumina's construction.[6]

The second question is closer. As discussed in detail above with respect to Illumina's patents, it is generally improper to read a limitation of a preferred embodiment into a claim term absent a clear disavowal of the scope of the term or unless the limitation can be fairly said to be the invention itself. The use of one macromolecule per DNA binding region is certainly a preferred embodiment. It is less clear whether it is a critical aspect of the invention that limits the claim term, in part because of the ambiguity of terms such as "single molecule" and "single DNA."

The patent states that "[t]he present method relates to methods and compositions for high-throughput analysis of *populations of individual molecules*, and more particularly, to methods and compositions related to fabrication of *single molecule arrays*…" '984 Patent 1:34-37. However, references in the patent to individual or single "molecules" may refer to individual DNA fragments, and not individual macromolecules. See *id.* 2:52-58 (describing arrays "that permitted efficient and convenient analysis of large numbers of *individual molecules, such as DNA fragments* covering substantially an entire mammalian-sized genome.").

Other parts of the specification suggest that single molecules refer to macromolecules. The "summary of the invention" describes several aspects of the array, all mentioning a "single molecule." For example, it states that "in another aspect, such single molecules are disposed in a

[5] BGI's argument is not that no construction is necessary because the language is clear, but instead that the invention encompasses multiple DNA sequences per binding region. This is plainly not in accordance with the language or the specification, and thus the term requires construction.

[6] The parties dispute the prosecution history of the '984 Patent as it relates to these terms. However, the prosecution history contains many of the same ambiguities as the specification and does not shed any additional light on the constructions.

planar array randomly distributed onto discrete spaced apart regions having defined positions. Preferably, in this aspect, the discrete spaced apart regions *each have an area of no more than a single molecule* and each is surrounded by an inter-regional space that is substantially free of other single molecules." *Id.* 4:17-23. Later, it states that "[g]enerally, the area of discrete spaced apart regions (1122) is selected, along with attachment chemistries, macromolecular structures employed, and the like, to correspond to the size of single molecules of the invention so that when single molecules are applied to surface (1120) substantially every region (1122) is occupied by no more than one single molecule." *Id.* 14:11-18. "Thus, a single molecule will 'occupy' all linkages to the surface at a particular discrete spaced apart region, thereby reducing the chance that a second single molecule will also bind to the same region." *Id.* 14:22-26.

BGI points out that the patent describes arrays in which only the "majority" of the binding regions contain one single molecule. Dkt. No. 97 at 9; '984 Patent 5:1-9. In addition, the patent claims state that more than 50% (or 80%) of the DNA binding regions have "multiple copies of one single DNA," which necessarily suggests that the remaining DNA binding regions could have more than "one single DNA." BGI's argument is persuasive with respect to the construction of "DNA binding regions," and I agree with BGI that Illumina's construction, which requires the binding region itself to contain "at most" one molecule, contradicts the context of the claims and the specification. I find that "binding region" does not need construction.

However, that does not address the heart of this inquiry, as the parties also dispute the meaning of the terms "[more than 50% of the] DNA binding regions [in the array] …," which Illumina contends should be construed as "[more than 50% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …" BGI contends that when the patentee desired to claim DNA binding regions of a specific size, it did so in dependent claims 4, 7, 9, and 10. Dkt. No. 97 at 7. These claims describe a diameter and sizing of the regions, but say nothing about the number of molecules that bind in each region. However, the portion of the patent specification that discusses this sizing suggests that it is to accommodate one "nanoball" per binding region. It states that "[h]aving 120-250 nm DNA sites in a regular grid with 250-500 nm center-to-center spacing will provide 20-80 times more DNA samples per surface than arrays with random attached

DNA with spots of about 1000 nm in size . . . Furthermore, attaching RCR products onto this dense grid of capture probe spots *ensures that each DNA ball is concentrated on a much smaller surface*, increasing the signal and the speed of biochemical assays." '984 Patent 16:43-52 (emphasis added).

Although this is another close question, I find that the specification and claim language support Illumina's construction to limit the binding regions to one DNA macromolecule. The specification demonstrates that the use of one macromolecule per binding region is more than a preferred embodiment; it is central to the invention. One of the patent's main inventions involves macromolecules of one cloned DNA fragment. The composition of the array uses the macromolecules placed in a way such that the signal is easily detectable, but also in a high density such that large numbers of molecules can be sequenced per surface area. BGI's construction would contemplate clusters of the macromolecules per binding site, which would call for larger binding regions than would be necessary if only one macromolecule was used. This diminishes a key benefit of the high-density array.

Further, BGI points to the description of "in situ" amplification in certain embodiments to argue for a broader construction encompassing multiple molecules per binding region. Dkt. No. 97 at 9. But this "amplification"—which also may refer to the process of creating macromolecules using RCR—does not clearly result in multiple molecules, but appears to relate to amplifying one macromolecule. *See* '984 Patent 6:18-27 ("In embodiments, DNA arrays are formed by attaching concatemers of the same fragment or by in-situ amplification *of a single DNA molecule*."). And for the reasons discussed above, multiple macromolecules per binding region would eliminate primary benefits of the claimed invention. Unlike my above analysis of enzymatic incorporation in the '984 Patent, the preferred embodiment involving one concatemer per binding site is fairly described as the invention itself.

Accordingly, I adopt Illumina's construction of the terms "[more than 50% of the] DNA binding regions [in the array] …," and "[more than 80% of the] DNA binding regions [in the array] …"

2. "more than 10^5 different DNAs comprising genomic sequences"

Term	BGI's Proposal	Illumina's Proposal	Court's Ruling
"more than 10^5 different DNAs comprising genomic sequences"	No construction necessary. *In the alternative to Illumina's proposed construction:* "more than 100,000 DNAs that have different genomic sequences"	"more than 100,000 DNAs that each have a different genomic sequence"	"at least 100,001 DNAs that each have different genomic sequences"

In its reply, BGI stated that it "does not object to the adoption of the following alternative proposal that captures the meaning intended by both parties: 'at least 100,001 DNAs that each have different genomic sequences.'" Dkt. No. 116 at 13. Illumina does not object to this proposal. Accordingly, "more than 10^5 different DNAs comprising genomic sequences" is construed as "at least 100,001 DNAs that each have different genomic sequences."

3. "array"

Term	BGI's Proposal	Illumina's Proposal	Court's Ruling
"array"	No construction necessary.	"a material or group of materials having a rigid or semi-rigid surface or surfaces, usually planar or substantially planar, which carries an array of sites containing nucleic acids, such that each member site of the array comprises identical copies of immobilized oligonucleotides or polynucleotides and is spatially defined and not overlapping with other member sites of the array; that is, the sites are spatially discrete"	"a solid phase support having a surface, usually planar or substantially planar, which carries an array of sites containing nucleic acids, such that each member site of the array comprises identical copies of immobilized oligonucleotides or polynucleotides and is spatially defined and not overlapping with other member sites of the array; that is, the sites are spatially discrete"

The specification expressly defines "array" in the "Definitions" section as "a solid phase support having a surface, usually planar or substantially planar, which carries an array of sites containing nucleic acids, such that each member site of the array comprises identical copies of

immobilized oligonucleotides or polynucleotides and is spatially defined and not overlapping with other member sites of the array; that is, the sites are spatially discrete." '984 Patent 63:31-37. BGI nonetheless argues that the term does not require construction because the definition describes a broader construction of the term than the claimed array comprises, is redundant, and imports extraneous limitations. Dkt. No. 97 at 13-15. These arguments are unpersuasive.

Construing the term "array" in accordance with the definition set forth in the patent does not mean that the patent claim must have the same breadth; indeed, the claim terms limit the array that is claimed. In addition, to the extent that the stated definition of the term "array" serves to limit the claim, which does not appear to be the case here, the definition indicates that that was the intent of the patentee in defining that term. *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012).

BGI has not pointed to a compelling reason to depart from this basic canon of claim construction. In reply, it argues that the specification describes array attributes not recited in the claims, and describes attributes that are recited in Claim 1 separately and in addition to the term array. Dkt. No. 116 at 13. It also claims that Illumina's construction would impermissibly import a "planar" requirement into the claims that would exclude Illumina's accused products, which include wells. *Id.* at 14. However, the definition of "array" does not require that the array be planar, only that it is usually planar. At any rate, this is not a reason to depart from the clearly-defined construction of "array" set forth in the patent.

At the same time, I agree with BGI that it is inappropriate for Illumina to import the definition of "solid phase support" into the definition of "array." Both terms are defined in the specification, but are defined separately. As with Illumina's patent term "nucleoside" above, I track the language that the patentee chose to use for each definition. Accordingly, "array" is construed as "a solid phase support having a surface, usually planar or substantially planar, which carries an array of sites containing nucleic acids, such that each member site of the array comprises identical copies of immobilized oligonucleotides or polynucleotides and is spatially defined and not overlapping with other member sites of the array; that is, the sites are spatially discrete."

4. "oligonucleotides"

Term	BGI's Proposal	Illumina's Proposal	Court's Ruling
"oligonucleotides"	No construction necessary. *In the alternative to Illumina's proposed construction:* "linear polymers of nucleotide monomers, in either single-stranded or double-stranded forms"	"linear polymers of nucleotide monomers"	"linear polymers of nucleotide monomers, in either single-stranded or double-stranded forms"

The patent defines "oligonucleotide" as "a linear polymer of nucleotide monomers" and states that the term is used interchangeably with the term "polynucleotide." '984 Patent 65:54-56. It states that "[a]s used herein, the terms may also refer to double stranded forms." *Id.* at 56-57. BGI again argues that this term does not require construction, but does not provide any basis to depart from the canon of claim construction that a patent may act as his own lexicographer. Dkt. No. 97 at 16. However, it proposes an alternative to include "in either single-stranded or double-stranded forms" to incorporate the second sentence of the definition. Dkt. No. 97 at 16. Illumina does not object to this inclusion. Dkt. No. 113 at 25; *see also* Dkt. No. 116 at 15. This definition is in accord with the definition in the specification and should be adopted.

CONCLUSION

I construe the disputed terms as follows:

Term	Court's Construction
"incorporating into the nucleic acid molecule"	"incorporating into the nucleic acid molecule at the 3' end"
"said protecting group can be modified or removed to expose a 3' OH group"	No construction necessary
"[comprises/comprising] an azido group"	"includes at least an azido group (i.e. a group of three nitrogen atoms covalently linked, represented as (–N3))"
"nucleoside"	"A 'nucleoside' is structurally similar to a nucleotide, but are missing the phosphate moieties. The term nucleoside encompasses analogs and derivatives of nucleosides. A derivative or analog of a nucleoside is molecules whose core structure is the same as, or closely resembles that of, a

	nucleoside, but which has a chemical or physical modification, such as a different or additional side groups, which allows the derivative nucleoside to be linked to another molecule."
"DNA binding regions"	No construction necessary.
"[more than 50% of the] DNA binding regions [in the array] …"	"[more than 50% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"
"[more than 80% of the] DNA binding regions [in the array]…"	"[more than 80% of the] DNA binding regions [in the array] are occupied by a single DNA molecule …"
"more than 50% of the DNA binding regions in the array have multiple copies of one single DNA of said more than 10^5 different DNAs"	"more than 50% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"
"more than 80% of the DNA binding regions in the array have multiple copies of the one single DNA"	"more than 80% of the DNA binding regions in the array are occupied by a single DNA molecule comprising multiple copies of only one of the more than 100,000 genomic DNA sequences"
"more than 10^5 different DNAs comprising genomic sequences"	"at least 100,001 DNAs that each have different genomic sequences"
"array"	"a solid phase support having a surface, usually planar or substantially planar, which carries an array of sites containing nucleic acids, such that each member site of the array comprises identical copies of immobilized oligonucleotides or polynucleotides and is spatially defined and not overlapping with other member sites of the array; that is, the sites are spatially discrete."
"oligonucleotides"	"linear polymers of nucleotide monomers, in either single-stranded or double-stranded forms"

IT IS SO ORDERED.

Dated: June 26, 2020

William H. Orrick
United States District Judge